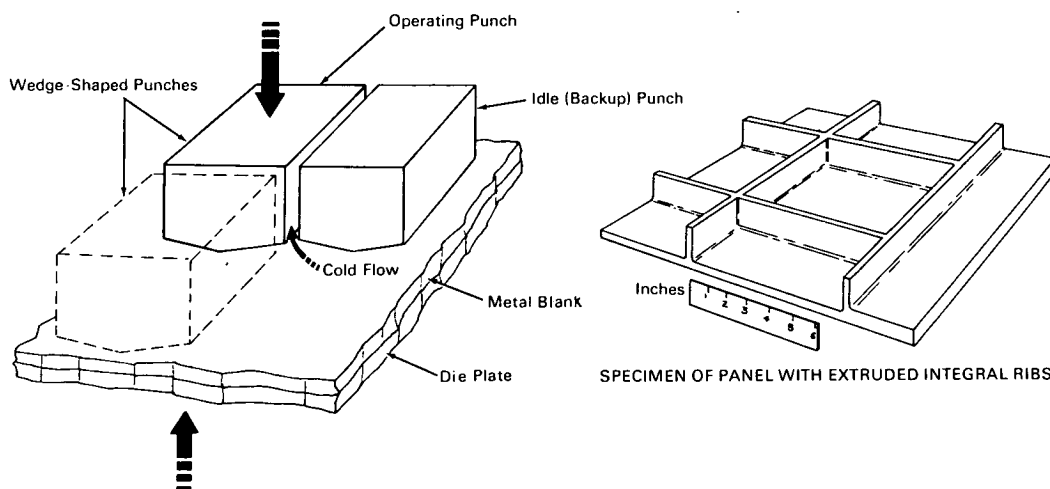


NASA TECH BRIEF



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Integral Ribs Formed in Metal Panels By Cold-Press Extrusion



The problem: Conventional methods used for the production of metal panels with integral ribs require expensive machining which wastes up to 90% of the metal as machining chips.

The solution: A method of cold-press extrusion in which the metal is forced into the desired configuration by plastic flow, without loss of material.

How it's done: A machine-finished sheet of metal is used as the starting blank. Initial forming of the ribs is done with wedge-shaped (narrow-angle) punches which are spaced in a grid pattern over the blank supported on a die plate. In order to seat the blank firmly and evenly on the die plate, maximum pressure is simultaneously applied to all of these punches.

After the blank has been properly seated, maximum pressure is separately applied to each of the wedge-shaped punches. As the pressure is applied, the metal flows or extrudes from the blank to fill the voids between the operating punch and the contiguous idle punches, which serve as backups for rib shaping. The punch faces and the blank are lubricated before and after each punching operation to allow the metal to flow more easily into the voids. At the end of this punching operation, the shaped blank is removed and annealed to relieve residual stresses and strain hardening. It is then repositioned on the die plate, and the process is continued using a set of flat punches in place of the wedge-shaped punches. Fully developed ribs (1-1/2 inches high) are formed by repeating the sequence of operations with wedge-shaped and flat punches, followed by annealing.

(continued overleaf)

Notes:

1. This fabrication process has been successfully used to form integral ribs in aluminum-alloy panels. It should also be practicable for other metals that lend themselves to extrusion.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama, 35812
Reference: B65-10141

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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(M-FS-230)